A Support Device For A Rib

Field of the Invention

The present invention relates to a support device for a rib (wall) between a floor and a roof.

The present invention has been developed primarily for use in supporting ribs either side of a mining roadway.

Background of the Invention

Underground roadways of different widths are driven into geological seams dependent on the characteristics of the seam itself and various mining regulations. Due to horizontal and vertical pressures, strata conditions, depth of seam, geological anomilies and other circumstances these roadways are prone to varying degrees of failure.

Known methods of supporting the roadway ribs to prevent failure include timber, steel or plastic mesh pinned with rib bolts, and various concrete products. These can be installed prior to or after mining activity to assist with support and stabilisation.

A disadvantage with these rib supports is that they cause lost production time during installation. A further disadvantage is that these devices can not be installed until a section of roadway is completed, and can thus expose mine workers to unsupported, potentially hazardous ribs for extended periods of time.

Object of the invention

It is an object of the present invention to substantially overcome or at least ameliorate one or more of the above disadvantages of the prior art, or at least to provide a useful alternative to existing rib supports.

Summary of the invention

In a first aspect, the present invention provides a support device for a rib between a floor and a roof, the device including;

an expansion means; and

a pair of resilient members each having a proximal end adapted for connection to the expansion means and a distal end curved away from the expansion means and adapted for engagement with the floor and roof respectively,

wherein when the device is positioned towards or against the rib and the expansion means is activated to drive the members apart, the member's distal ends are

driven substantially vertically into engagement with the floor and the roof and a portion of the device is driven substantially laterally into abutment against the rib.

In a second aspect, the present invention provides a support device, the device comprising:

an expander; and

a pair of resilient members each having a proximal end adapted for connection to the expander and a distal end curved away from the expander.

In one embodiment, the expansion means is mechanically operable to selectively permit or inhibit tensioning of the rib support.

In another embodiment, the expansion means is hydraulically operable to selectively permit or inhibit tensioning of the rib support.

The distal ends of the resilient members preferably have sawtooth profiles.

The resilient members are preferably made from pre-curved spring steel.

In a preferred embodiment, the device includes locking means adapted to lock the resilient members in engagement with the floor and roof after activation of the expansion means.

In one form, the locking means is fixed to the support device. In another form, the locking means is removable from the support device.

Brief Description of the Drawings

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a side view of an embodiment of a support device according to the present invention, in a disengaged position;

Figure 2 is a side view of the support device shown in Figure 1 in an engaged position; and

Figure 3 is a partial front view of the device shown in Figure 2.

Detailed Description of the Preferred Embodiments

Figures 1, 2 and 3 show an embodiment of a support device, generally indicated by the reference numeral 8, according to the invention. The device 8 includes an expansion means (expander) 10 that includes an inner square hollow section (SHS) steel member 20 that slides within an outer SHS steel member 22. The expansion means 10 also includes a jacking arrangement welded to the member 22, that includes a jacking lever 24, and a ratchet device 26 welded to the first member 20.

The device 8 also includes a pair of curved resilient members 12a, 12b formed from pre-curved spring steel. Each of the members 12a and 12b are welded to the members 20 and 22 respectively at their proximal ends 27a and 27b.

The resilient members 12a and 12b are oppositely extending and have distal ends 28a, 28b curved away from the expansion means 10. The distal ends 28a, 28b (as best seen in Figure 3) terminate with a sawtooth profile.

The operation of the device 8 will now be described. In use, the support device 8 is positioned such that the distal ends 28a, 28b of each of the resilient members 12a, 12b are placed near the floor 18 and roof 16 respectively of an underground roadway and close to the rib 14. The device 8 is oriented such that the distal ends 28a, 28b of the resilient members 12a, 12b curve away from the rib 14.

The jacking lever 24 is then manually operated such that a pawl (not shown) engages with the ratchet device 26 to effect relative expanding movement between the members 20 and 22. This movement drives the resilient members 12a, 12b away from each other, in the directions indicated by vertical arrows 30 in Figure 1, and drives the ends 28a and 28b of the resilient members 12a and 12b into engagement with the floor 18 and roof 16 respectively, as shown in Figure 2. The sawtooth profile of the members distal ends 28a and 28b assists them in securely engaging with the roof 16 and floor 18.

Further operation of the jacking lever 24 results in the members 12a, 12b, bowing under tension towards the rib 14 which drives a portion of the device 8 adjacent the expansion means 10 laterally, in the direction of horizontal arrow 32 in Figure 1, into abutment against the rib 14. As the device 8 is forced into abutment against the rib 14, it thereby resists movement of the rib 14 in the opposite direction to the arrow 32 and advantageously provides support against failure of the rib 14 in that opposite direction. A number of the devices 8 would typically be placed spaced apart along a section of roadway needing support.

As described above, an advantage of the device 8 as it can be quickly and easily locked into a position supporting of the rib 14.

Another advantage of the device 8 is it can be also used with other rib support systems (ie. steel or plastic mesh) interposed between the device 8 and the rib 14 and offer support with or without the installation of rib bolts.

Another advantage of the device 8 is that if any lateral movement of the rib 14 occurs during use, the distal ends of the resilient members 12a, 12b are forced more strongly into the floor 18 and roof 16 which assists in retaining the device 8 in position.

A further advantage of support device 8 is that it can be easily and quickly retracted from the rib 14 by releasing the ratchet device 26 for re-use at a later stage in the mining cycle or, alternatively, left as a permanent support.

In other embodiments of the invention (not shown), the expansion means 10 can be activated to expand by other mechanical components (such as screws), hydraulically (such as hydraulic cylinders) or pneumatically (such as, pneumatic cylinders).

In another embodiment (not shown), the expansion means 10 can be disengaged from the remainder of the support device 8, after the resilient members 12a and 12b have been driven into engagement with the roof 16 and floor 18. As an example, each member 20 and 22 can include one or more holes spaced along it's length. A pin or other such fastener can be inserted through two corresponding holes (when aligned) to lock the support device 8 in an engaged/abutted position. This permits a single expansion means 10 to be disengaged and utilised during the expansion and placement of multiple rib support devices 8.

Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.